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Applicant: Fujimoto et al.  
Serial No.: 09/857,382  
Filed: July 23, 2001  
Group Art Unit: 1775  
Examiner: Piziali, Andrew T.  
Confirmation No. 4726  
Title: "HYDROPHILIC MEMBER"

**REPLY BRIEF**

Mail Stop Appeal Brief-Patents  
Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Sir:

In connection with the above-identified application, and in reply to the Examiner's Answer (Answer) dated 29 August 2003, please enter the instant Reply Brief pursuant to 37 CFR 1.193(b)(1).

Issues Raised in the Answer

1. At item (7) on page 2 of the Answer the Examiner asserts that he does not agree with appellant's assertion that the claims do not stand or fall together, because the claims are not argued separately.

### Appellant's Response

Appellant respectfully submits that in its Brief it has separately argued the merits of dependent claims 7, 8 apart from the independent claim. Accordingly, it is again respectfully submits that these claims do not stand or fall with the independent claim 1

2. In item 2 at the paragraph bridging pages 3-4 of the Answer, and again in item 11 at the last full paragraph on page 7 of the Answer, the Examiner asserts that it would have been obvious to one having ordinary skill in the art at the time of the invention was made to use SnO<sub>2</sub> as the photocatalyst layer of Tada because it is functionally equivalent to TiO<sub>2</sub>, because both function as photocatalysts.

### Appellant's Response

Appellant respectfully traverses the Examiner's assertion because, in fact, SnO<sub>2</sub> and TiO<sub>2</sub> are not functionally equivalent photocatalysts, whereas the teachings of the applied art, when properly considered as a whole, teaches away from the substitution proposed by the Examiner.

It is conventionally recognized that TiO<sub>2</sub> is a particularly good (reactive) photocatalyst, especially in the anatase form thereof, whereas SnO<sub>2</sub> is not. According to the disclosure of Tada : his invention is directed to "...an anti-fogging and stain-prevented glass article, having excellent long-term anti-fogging and stain preventing properties..."; one of three *necessary requirements* for the article is that the photocatalytic layer thereof have "high photocatalytic

activation” to efficiently oxidize and decompose organic substances; and his list of appropriate photocatalysts does not include  $\text{SnO}_2$ . See column 2, lines 9-54 of Tada. On the other hand, while Komatsu suggests that  $\text{SnO}_2$  may be used as a photocatalyst according to his invention, he too specifically uses  $\text{TiO}_2$  as the photocatalytic material throughout his discussion and specific examples because of its recognized high photocatalytic activity. Still further, the Greenberg patent cited by the Examiner (US Patent 6,027,766) does not include  $\text{SnO}_2$  as a photocatalytic (PASC) in his list of appropriate materials discussed at his col. 3, lines 22-31, although he includes zinc/tin oxides in such list, and otherwise uses  $\text{SnO}_2$  for a different purpose, i.e., as a sodium ion diffusion barrier (SIDB) material to be deposited between a substrate containing sodium ions and a photocatalytic (PASC) material according to his invention (discussed, for example, at his col. 8, line 55 – col. 10, line 4).

In light of the full, fair teachings of the references as a whole, appellant respectfully submits that persons skilled in the art would not consider it obvious to substitute  $\text{SnO}_2$  as the photocatalytic material in Tada’s disclosed articles because  $\text{SnO}_2$  does not exhibit high photocatalytic activity, as expressly required by Tada. The proposed modification violates an essential aspect of Tada’s invention.

3. In item 11 at the paragraph bridging pages 6-7 of the Office Action, the Examiner asserts that the prior art (Tada, Komatsu and Greenberg) teach the formation of a rutile tin oxide layer as claimed in that both Tada and Komatsu discuss formation of a photocatalytic layer via CVD methods, while Greenberg discloses that in his Example 3A (cols. 16-17) the formation of a layer

of tin oxide via a CVD method resulted in a cassiterite (rutile) structure.

#### Appellant's Response

Apart from the fact that the Greenberg reference is not actually one of the references forming the basis of the Examiner's rejection (see item 2 on pages 3-5 of the Answer), appellant respectfully traverses the Examiner's assertion, again, because the teachings of the applied art, when properly considered as a whole do not teach the claimed feature or achieve the advantages achieved by the claimed invention.

While Tada and Komatsu may disclose use of CVD methods for forming a photocatalytic layer, again the discussion of the CVD methods in these is in relation to the formation of a  $\text{TiO}_2$  photocatalytic layer, not an  $\text{SnO}_2$  layer. Conversely, in Greenberg, the CVD deposition of  $\text{SnO}_2$  forms a sodium ion diffusion barrier (SIDB) layer, not a photocatalytic (PASC) layer, and a different material (again  $\text{TiO}_2$ ) is subsequently used in forming the photocatalytic (PASC) layer. The conditions for forming a photocatalytic layer are different from those for forming a simple barrier layer, and as such persons skilled in the art would not consider it obvious to hypothetically modify Tada's photocatalytic layer by forming it in the same manner as Greenberg forms his SIDB layer. For example, the photocatalytic layer of Tada is annealed after it is formed (see col. 4, lines 24-28), whereas the SIDB cassiterite tin dioxide layer mentioned at Greenberg's cols. 16-17 have not been annealed. Additionally, it is noted that while Tada discusses the possibility of forming a photocatalytic layer using a CVD method, this is expressly not his preferred method (he prefers sol-gel methods) because the photocatalytic layer requires extra processing steps to form the desired

surface irregularities (col. 9, lines 7-59, especially lines 13-15 and 46-47).

Although Greenberg subsequently anneals the SIDB layer together with a PASC layer deposited thereon, Greenberg does not determine/indicate the form/phase of the annealed SIDB layer (see his col. 17, line 4 – col. 19, line 55), but he does indicate that the annealed PASC layers had “...a large variation in surface roughness and particle size and crystalline phase...”, which is contrary to the present invention which consistently achieves a desired surface roughness by forming the rutile  $\text{SnO}_2$  layer. This is not surprising, however, given that Greenberg really is not concerned with the form of his SIDB tin dioxide layer as discussed at the paragraph bridging his cols. 8-9 (in other words Greenberg does not appreciate or suggest this important aspect of the claimed invention).

Still further, appellant respectfully submits that even if Tada were hypothetically modified relative to the Komatsu (and Greenberg) references, any resulting article would not achieve the an important advantage of the present invention, i.e., again with reference to the discussion at his col. 9, lines 7-59, Tada requires special processing of the photocatalytic layer to achieve the desired surface irregularities (various sol-gel techniques used when forming the layer or subsequent plasma etching). These special processing techniques are unnecessary in the hydrophilic member of the invention.

4. In item 11 at the first paragraph on page 6 of the Office Action, the Examiner traverses appellant's argument regarding the significance of different surface polarities of tin dioxide and silicon dioxide and that bath soap is anionic in achieving a desirable low contact angle (super-hydrophilic properties) based on Tada's discussion that the polarity (non-polarity or low polarity) of silicon dioxide alone is responsible for the low contact angle.

### Appellant's Response

Appellant respectfully traverses the Examiner's asserted position because Tada's disclosure may not be entirely accurate on the matter. See, for example, the discussion at Komatsu's column 2, lines 33-39 where he discusses that silicon dioxide produces a hydrophilic OH group on its surface and generally has a hydrophilic property, while Komatsu achieves his desired hydrophilic properties through use of a silicon dioxide layer and (especially) by making such layer porous .

Again, appellant respectfully submits that the claimed combination of the tin oxide layer with a rutile structure and the overcoat layer with opposite surface polarity and the favorable surface roughness improves the hydrophilic restoration properties of the tin oxide layer, and it becomes possible to obtain long-term stability of the hydrophilic properties.

In this regard, appellant encloses another copy of the Exhibit A hereto (which is clearer than the copy submitted with the Brief), including a chart and a graph comparing hydrophilic glass according to the invention with other glass samples, particularly relating to the change of contact angle after soap washing. In the chart, "TEC glass" refers to normal glass having an SnO<sub>2</sub> layer formed thereon with on on-line CVD apparatus, while the upper two examples in the chart (the lower two curves in the graph) correspond to the present invention. As is readily apparent the change of contact angle with the two examples according to the invention is much less overall, as well as in rate of change, in comparison to the other glass samples. According to the present invention, the advantageous hydrophilic properties are achieved by the surface polarity

and the surface irregularities, not by the photocatalytic properties of  $\text{SnO}_2$ , which (again) are little.

Such aspect of the invention is not achieved or suggested by Tada, who does not use  $\text{SnO}_2$  as a photocatalyst, and discloses that the surface irregularities of his photocatalytic film are achieved either by transfer of the surface irregularities of the alkali shut-off film through to the photocatalytic layer or by directly forming irregularities on the photocatalytic film surface, contrary to the claimed invention; or by Komatsu who indicates that it is the porous nature of Komatsu's  $\text{SiO}_2$  covering layer that imparts the desired hydrophilicity to his anti-fog element, not surface irregularities transferred through from the photocatalytic layer, contrary to the present invention and to Tada.

5. In item 11 at the last two paragraphs on page 8 of the Office Action, the Examiner asserts that the feature of claim 8, an undercoat film comprising a layered body of tin oxide and silicon oxide, is met by Ando disclosure of a uniform layer of multiple components because appellant's specification presents a discussion of a layered body which can broadly read on multiple different layers or a single layer of a compound oxide film comprised of silicon and tin oxide.

#### Appellant's Response

Appellant respectfully traverses the Examiner's asserted position because it does not reasonably reflect appellant's actual disclosure. Particularly, while the discussion at page 5, lines 28-31 indicates that the undercoat film 4 may comprise a "compound oxide film of silicon oxide and tin oxide", such discussion and the further discussion at page 6, lines 2-7 very plainly indicates

that the discussion of a "layered body" pertains to a structure involving multiple, different films layered one on top the other. Again, it is respectfully submitted that such a layered body is not disclosed or suggested by Ando.

#### CONCLUSION

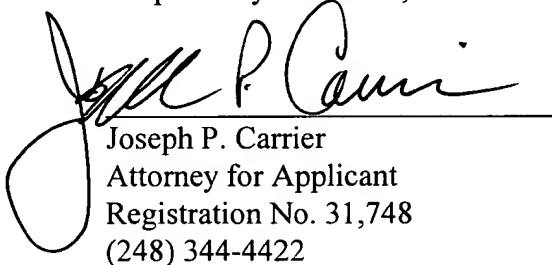
Based on all the foregoing comments, and those presented in appellant's Brief on Appeal, it is again respectfully submitted that the Examiner has failed to establish prima facie obviousness under 35 USC '103(a) of any of claims 1, 3-10 and 12-20 on appeal.

Correspondingly, appellant respectfully submits that the Examiner's rejections of the claims on appeal are in error, and a reversal of same is respectfully requested.

Favorable consideration and reversal of the final rejection are earnestly solicited.

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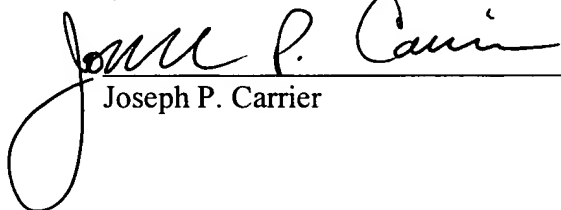
Respectfully submitted,

  
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#### **CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the US Postal Service as First Class Mail, in an envelope provided with sufficient postage to Mail Stop Appeal Brief-Patents, Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450 on October 27, 2003.

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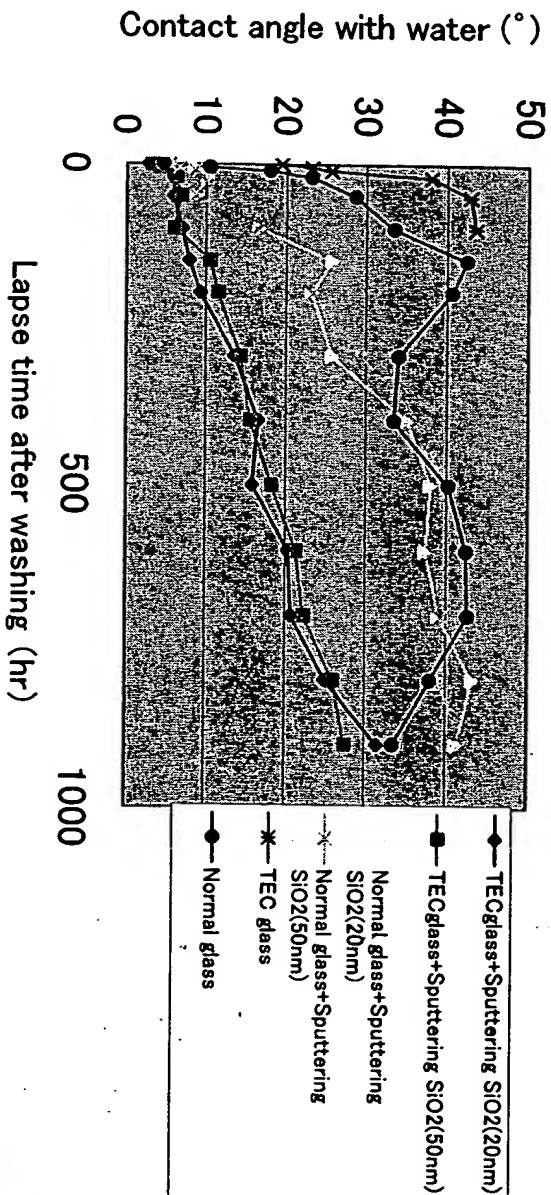
  
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Joseph P. Carrier



Comparison of Hydrophilic glass (Embodiment) and other glass (Comparative example) with respect to change of contact angle

	0	5	10	20	50	100	150	200	300	400	500	600	700	800	900
TEC glass+Sputtering SiO <sub>2</sub> (20nm)	2.9	5.3	6.3	6.3	6.3	7.3	7.9	9.3	13.6	16.5	18.8	20.3	20.7	25	31.5
TEC glass+Sputtering SiO <sub>2</sub> (50nm)	3.2	4.2	6.1	6.3	10.8	16.1	10.5	11.5	14.3	15.5	18.2	21.3	22.3	25.9	27.5
Normal glass+Sputtering SiO <sub>2</sub> (20nm)	5.6	8.5	8.8	10.1	8.8	16.6	25.7	23.2	25.7	35.1	38	37.4	39.1	43.2	41.3
Normal glass+Sputtering SiO <sub>2</sub> (50nm)	5.5	6.7	8.6	9.5	8.7	16.4	23.8	23.3	29.5	36.7	39.5	38.4	39.4	39	42.3
TEC glass	19.4	23.2	25.6	38	42.8	43.5									
Normal glass	4.7	10.4	17.9	23.1	28.6	33.4	42.4	40.6	34	33.4	40.2	42.4	42.6	38	33.4

Change of contact angle per lapse of time after soap washing



EXHIBIT

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